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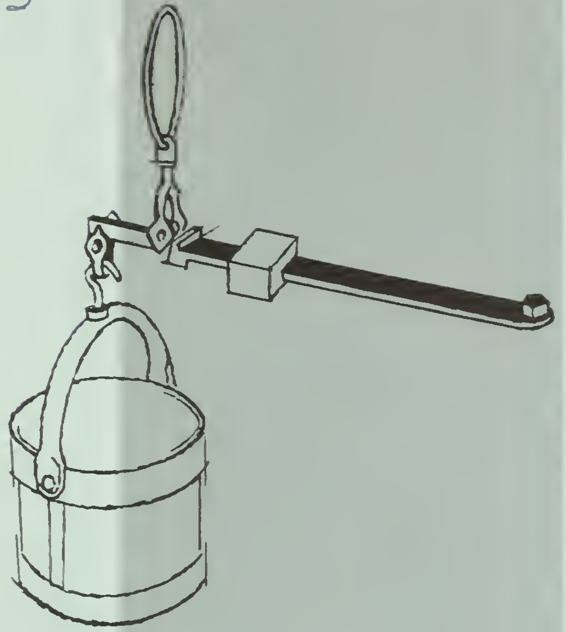
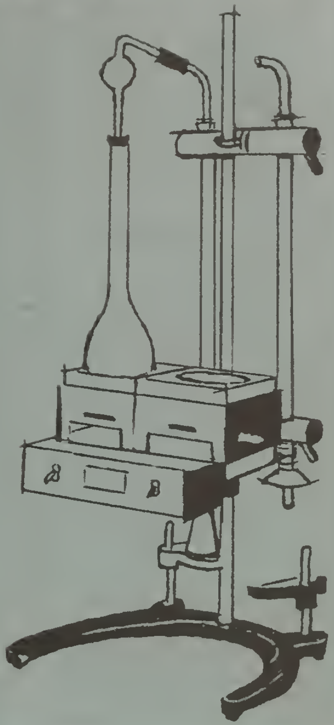
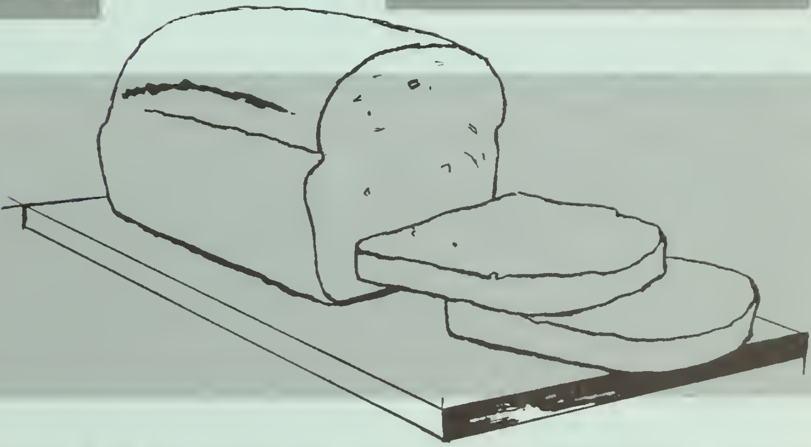




Physical, Chemical, Milling, and Baking Properties of Carlot Receipts of Wheat

1960 Crop



UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Marketing Service Grain Division

PREFACE

Each year, beginning in 1939, the Grain Division, AMS, has been collecting data on the physical, chemical, milling, and baking properties of wheat samples representing carlot receipts which were composited by grade at different markets. These samples were collected during the first 90 days of the crop movement. Beginning with the crop year 1947, reports have been issued for each year for administrative use only. In addition, in 1953 a summary of the data for the crop years 1939 through 1952, which showed the averages for each year, was issued.

From time to time interested parties outside of the Department of Agriculture have requested this information. Starting with the 1958 crop the report has been issued in a new format and made available to all interested parties outside of the Department. The report is designated as AMS-356 for the particular crop year.

The report of the 1960 crop is based on the results of studies conducted by the Standardization and Testing Branch under the direction of Lawrence Zeleny, Chief; W. H. Hosterman, Assistant Chief; and M. H. Neustadt, Head, Standardization Section. Milling and baking work was done by Clemmer Marcus, Tyler F. Hartsing, Georgia M. Gurney, and Dorothy Humphrey of the Standardization Section. Chemical analyses were performed by the Testing Section, Edith A. Christensen, Head. The Crops Research Division, ARS, cooperated in this study. C. C. Fifield, who directed the baking studies, and A. J. Pinckney and W. T. Greenaway, who made certain chemical tests, are members of this Division.

The mention of trade products in this report does not imply that they are endorsed or recommended by the United States Department of Agriculture over other products not mentioned.

WHEAT - PROPERTIES OF RECEIPTS - 1960 CROP

GSR Project 47

The 128 samples for which data are given in this report represent composites of 14,841 commercial carlot receipts of wheat of the 1960 crop which were collected by the designated district offices and segregated according to subclass and grade.

Some of the terms used in this study and their significance are explained as follows:

Ash content is expressed on a 14.0-percent moisture basis for both wheat and flour. The ash content of flour is a well-recognized but not precise measure of flour refinement. Generally the more bran that is in the flour the higher the ash content.

Averages shown are weighted averages; that is, the number of carlots represented by each sample is used in computing the average for all samples in each grade and in each subclass of the wheat.

Carotenoid content is used to evaluate the color characteristics of durum wheat and semolina. Water-saturated butyl alcohol is used to extract the pigments and the color is expressed as the carotene equivalent in parts per million (p.p.m.). Macaroni color depends largely on carotenoid content and lipoxidase value (color-destroying enzyme) of the durum wheat and semolina.

Cooky factor is used to evaluate the quality of Soft Red Winter Wheat, Yellow Hard Winter Wheat, and White Wheat and is determined by dividing the average diameter of the cookies by their average thickness. In evaluating cooky factors the following scores may be used:

5.51 and higher	Very good
5.26 to 5.50	Good
5.01 to 5.25	Fair
4.51 to 5.00	Poor
Less than 4.50	Very poor

Crumb color and grain. The scores used in judging crumb color and grain are based on a visual examination of the loaf of bread and the following table may be used in interpreting the results:

100 and above	Excellent
90 to 99	Very good
80 to 89	Good
70 to 79	Fair
60 to 69	Poor or questionable
59 or below	Very poor or unsatisfactory

Damaged kernels are kernels and pieces of kernels of wheat and other grains which are heat damaged, sprouted, frosted, badly ground damaged, badly weather damaged, moldy, diseased, or otherwise materially damaged.

Fat acidity is an index of soundness and is defined as the number of milligrams of potassium hydroxide required to neutralize the free fatty acids present in 100 grams of wheat, expressed on a moisture-free basis. Freshly harvested wheat of unquestionable soundness nearly always has a fat acidity value of less than 20. Badly deteriorated wheat may have a fat acidity value of over 100.

Loaf volume is the maximum volume obtainable by using a baking formula which in addition to the basic ingredients included shortening, malted wheat flour, nonfat dry milk, and the optimum amount of potassium bromate. These values are somewhat higher than those reported prior to 1956 because of the substitution of a new type of baking pan. With the baking procedure used bread loaf volume is considered the best indication of baking strength.

Loaf volume, expected, is based on flour protein content and is the loaf volume obtained from baking experiments in which the flour from 365 samples of hard red spring wheat and hard red winter wheat for the crop years 1957 to 1959 were used.

Milling score is a mathematical expression involving many factors. It is calculated from the equation:

$$\begin{aligned}\text{Milling score} = 100 - \Big[& (80 - \%\ \text{yield}) + (\%\ \text{ash} - 0.30) \\ & + 0.04\ (160 - \text{feed rate in g. per min.}) \\ & + 0.2\ (65 - \%\ \text{patent}) \\ & + 0.5\ (16 - \%\ \text{milling moisture}) \Big]\end{aligned}$$

Milling scores may be expressed in adjective terms as follows:

87 to 91	Excellent
82 to 86	Very good
77 to 81	Good
72 to 76	Fair
67 to 71	Poor

Milling yield. Flour or semolina yield is the percentage of flour or semolina derived, respectively, from the wheat or durum wheat under the laboratory milling conditions employed. Yields are expressed on a moisture-free basis.

Mixing time is the optimum time necessary to obtain a dough of maximum consistency in the experimental bread-making process used. The following adjective ratings may be used for the numerical values of mixing time:

Up to 1 minute	Very short
1 minute up to 2 minutes	Short
2 to 2-1/2 minutes	Medium
More than 2-1/2 minutes	Long

Mixogram characteristics. Mixogram curves made on a National recording micro mixer (Mixograph) can be used to evaluate dough-mixing characteristics. In this report the development time and the mixing tolerance are included. The development time is defined as the time required for maximum dough development (the peak of the curve). The time during which the dough maintains its stability without appreciable change in the height of the curve is the mixing tolerance. Generally speaking, bakers prefer flours with a long mixing tolerance which is usually associated with long development time.

Pearling index is the percentage of wheat pearled off in 1 minute when 20 grams of wheat are pearled in a No. 38 Strong-Scott Pearler. The harder the grain, the lower the pearling index. Hard wheats generally have pearling indexes below 35 and soft wheats above 35.

Percentages are expressed on the basis of weight.

Protein content is determined by the standard Kjeldahl procedure using the factor 5.7. Values are reported on a 14.0-percent moisture basis. Protein content is recognized as a factor in determining baking quality.

Sedimentation value of wheat is determined by the method described in Cereal Laboratory Methods, Sixth Edition (1957). The sedimentation value is a combined index of gluten content and gluten quality and is therefore a useful measure of bread-baking strength. High sedimentation values are normally associated with superior bread-baking strength. The properties of wheat usually associated with different ranges in sedimentation value are as follows:

1. Sedimentation value of 60 and over represents hard wheat of high protein content, superior gluten quality, superior baking strength, suitable for mixing with weaker wheats for bread flour.

2. Sedimentation value of 40 to 59 represents hard wheat of moderately high protein content, good gluten quality, suitable for bread flour production.

3. Sedimentation value of 20 to 39 represents low-protein-content hard wheat or high-protein-content soft wheat, fair baking strength, suitable for making "all purpose" flour or mixing with stronger wheat for bread flour.

4. Sedimentation value of less than 20 represents low protein content, weak gluten quality wheat, suitable for cake, pastry, cooky, and cracker flour but not for bread flour.

Test weight per bushel is the weight of a Winchester bushel determined on dockage-free wheat.

Visual appearance and numerical rating of macaroni is also evaluated by visual color comparisons. The appearance to the observer is described by adjective rating and numerically. The best is rated 1 and the poorest 6.

Water absorption is the optimum amount of water required to bring the dough to the desired standard consistency in the experimental bread-making process used. The baking industry prefers high water absorption in the bread-making process.

HARD RED WINTER WHEAT

Grade	No. 1 Dark Hard Winter				
District	Enid	Fort Worth	Kansas City	Minneapolis	Ogden
No. of carlots composited	160	57	1238	63	313
WHEAT:					
Test weight per bushel, lbs.	62.3	62.5	62.5	61.5	61.6
Weight per 1000 kernels, g.	29.8	30.3	30.7	28.3	27.7
Damaged kernels, pct.	0.2	0.2	----	0.3	0.4
Dark, hard, and vitreous kernels, pct.	86.0	81.0	81.0	95.0	86.0
Ash, pct.	1.56	1.45	1.56	1.40	1.48
Protein, pct.	13.3	13.0	12.0	13.6	12.7
Fat acidity	18	14	14	13	12
Sedimentation value	54	44	41	48	49
Pearling index	29	30	28	30	28
Flour yield, pct.	77.3	78.6	78.7	77.8	75.4
Milling score	86.0	89.6	88.3	88.5	86.2
FLOUR:					
Ash, pct.	0.52	0.50	0.51	0.48	0.49
Protein, pct.	12.4	12.0	11.3	12.6	11.6
Mixing time, min.	2.25	2.25	2.25	2.25	2.25
Water absorption, pct.	68	68	60	61	63
Mixogram characteristics:					
Development time, min.	2.00	2.25	2.50	2.50	2.50
Mixing tolerance, min.	1.50	1.50	1.25	2.00	2.00
BREAD:					
Loaf volume, cc.	810	788	800	808	800
Expected loaf volume, cc.	810	794	768	817	779
Grain	85	85	85	80	85
Crumb color	80	75	75	75	75

Grade	No. 1 Dark Hard Winter (cont.)			
District	Omaha	Portland	Wichita	AVERAGE Total No.
No. of carlots composited	62	185	259	2337
WHEAT:				
Test weight per bushel, lbs.	61.7	61.6	62.4	62.2
Weight per 1000 kernels, g.	28.4	27.7	29.8	29.8
Damaged kernels, pct.	0.1	0.1	Trace	0.1
Dark, hard, and vitreous kernels, pct.	78.0	85.0	86.7	83.3
Ash, pct.	1.57	1.38	1.57	1.53
Protein, pct.	12.3	12.5	12.1	12.3
Fat acidity	16	13	19	14
Sedimentation value	54	48	44	44
Pearling index	27	28	29	28
Flour yield, pct.	76.3	76.1	77.1	77.7
Milling score	87.6	86.6	86.6	87.6
FLOUR:				
Ash, pct.	0.49	0.49	0.51	0.50
Protein, pct.	11.4	11.6	11.5	11.5
Mixing time, min.	2.50	2.50	2.50	2.30
Water absorption, pct.	63	62	60	61
Mixogram characteristics:				
Development time, min.	3.00	2.75	2.50	2.49
Mixing tolerance, min.	1.50	2.00	1.50	1.49
BREAD:				
Loaf volume, cc.	810	800	790	800
Expected loaf volume, cc.	771	779	775	776
Grain	90	80	80	84
Crumb color	80	75	80	76

HARD RED WINTER WHEAT

Grade	No. 2 Dark Hard Winter			
District	Kansas City	Ogden	Omaha	Portland
No. of carlots composited	159	117	7	36
WHEAT:				
Test weight per bushel, lbs.	59.5	59.6	61.1	59.7
Weight per 1000 kernels, g.	24.5	25.6	27.6	26.2
Damaged kernels, pct.	----	----	----	0.2
Dark, hard, and vitreous kernels, pct.	74.0	89.0	86.0	87.0
Ash, pct.	1.73	1.54	1.57	1.42
Protein, pct.	11.7	13.7	12.4	13.3
Fat acidity	18	10	14	14
Sedimentation value	40	59	55	44
Pearling index	26	30	27	29
Flour yield, pct.	75.4	74.6	76.1	75.5
Milling score	83.8	85.4	87.5	85.0
FLOUR:				
Ash, pct.	0.51	0.49	0.49	0.50
Protein, pct.	11.0	12.7	11.7	12.5
Mixing time, min.	2.25	2.00	2.25	2.50
Water absorption, pct.	59	62	63	63
Mixogram characteristics:				
Development time, min.	2.75	2.25	2.75	2.50
Mixing tolerance, min.	1.50	1.75	2.25	2.25
BREAD:				
Loaf volume, cc.	790	845	788	820
Expected loaf volume	756	821	783	814
Grain	75	90	85	95
Crumb color	70	75	75	75

HARD RED WINTER WHEAT

Grade	No. 2 Dark Hard Winter (cont.)		No. 3 Dark Hard Winter
District	Wichita	AVERAGE	Kansas City
No. of carlots composited	30	Total No. 349	45
WHEAT:			
Test weight per bushel, lbs.	59.5	59.6	57.7
Weight per 1000 kernels, g.	25.3	25.2	25.2
Damaged kernels, pct.	----	0.2	----
Dark, hard, and vitreous kernels, pct.	91.3	82.1	82.0
Ash, pct.	1.66	1.62	1.74
Protein, pct.	12.1	12.6	12.0
Fat acidity	15	14	19
Sedimentation value	45	48	41
Pearling index	26	28	25
Flour yield, pct.	77.1	75.3	74.3
Milling score	85.6	84.7	83.2
FLOUR:			
Ash, pct.	0.53	0.50	0.52
Protein, pct.	11.6	11.8	11.1
Mixing time, min.	2.50	2.21	2.25
Water absorption, pct.	60	60	57
Mixogram characteristics:			
Development time, min.	1.50	2.45	2.75
Mixing tolerance, min.	1.25	1.65	1.50
BREAD:			
Loaf volume, cc.	790	811	765
Expected loaf volume, cc.	779	786	760
Grain	85	83	80
Crumb color	75	73	70

HARD RED WINTER WHEAT

Grade	No. 1 Hard Winter					
District	Chicago	Enid	Fort Worth	Kansas City	Minneapolis	Ogden
No. of carlots composited	65	303	80	2023	9	134
WHEAT:						
Test weight per bushel, lbs.	60.9	62.6	61.8	62.6	61.3	62.2
Weight per 1000 kernels, g.	27.1	32.2	31.8	31.8	28.2	27.8
Damaged kernels, pct.	0.5	----	Trace	0.2	0.7	----
Dark, hard, and vitreous kernels, pct.	61.0	61.0	65.0	53.0	60.0	62.0
Ash, pct.	1.58	1.54	1.45	1.60	1.58	1.49
Protein, pct.	12.2	11.6	12.0	10.9	11.4	10.7
Fat acidity	18	18	16	15	16	11
Sedimentation value	34	43	44	36	38	37
Pearling index	31	31	32	30	34	29
Flour yield, pct.	78.4	76.0	75.2	76.3	77.1	75.9
Milling score	87.1	87.7	85.7	86.8	89.2	87.5
FLOUR:						
Ash, pct.	0.52	0.48	0.49	0.48	0.47	0.48
Protein, pct.	11.0	10.6	11.2	10.1	10.6	9.6
Mixing time, min.	2.50	2.25	2.25	2.25	2.25	2.00
Water absorption, pct.	65	67	65	58	61	62
Mixogram characteristics:						
Development time, min.	3.00	2.75	2.25	2.75	3.00	3.00
Mixing tolerance, min.	2.50	1.50	1.25	1.50	2.00	2.50
BREAD:						
Loaf volume, cc.	805	793	750	760	788	738
Expected loaf volume, cc.	756	741	764	722	741	703
Grain	85	85	90	80	80	75
Crumb color	80	80	85	70	70	70

Grade	No. 1 Hard Winter (cont.)					
District	Omaha	Peoria	Portland	St. Louis	Wichita	AVERAGE
						Total No.
No. of carlots composited	74	54	168	35	217	3162
WHEAT:						
Test weight per bushel, lbs.	61.2	60.5	63.4	61.8	62.5	62.5
Weight per 1000 kernels, g.	28.6	28.4	29.3	31.0	32.0	31.3
Damaged kernels, pct.	----	1.6	0.1	----	0.5	0.2
Dark, hard, and vitreous kernels, pct.	62.0	45.0	60.0	47.0	67.3	56.0
Ash, pct.	1.60	1.71	1.47	1.60	1.56	1.58
Protein, pct.	11.3	10.9	9.5	11.0	11.8	11.0
Fat acidity	17	17	16	16	16	15
Sedimentation value	35	27	28	34	43	37
Pearling index	31	24	27	30	32	30
Flour yield, pct.	78.0	75.0	76.1	76.3	77.7	76.4
Milling score	89.2	85.3	85.2	87.5	88.3	87.0
FLOUR:						
Ash, pct.	0.49	0.48	0.51	0.48	0.48	0.48
Protein, pct.	10.3	9.8	8.7	10.0	11.0	10.2
Mixing time, min.	2.00	1.75	2.50	2.00	2.50	2.26
Water absorption, pct.	63	57	63	60	61	60
Mixogram characteristics:						
Development time, min.	2.50	2.25	3.00	2.25	2.50	2.73
Mixing tolerance, min.	2.50	1.25	3.00	2.00	1.00	1.63
BREAD:						
Loaf volume, cc.	795	768	663	785	785	761
Expected loaf volume, cc.	730	710	669	718	756	724
Grain	90	85	75	90	80	81
Crumb color	80	80	70	85	80	73

HARD RED WINTER WHEAT

Grade	No. 2 Hard Winter				
District	Fort Worth	Kansas City	Minneapolis	Omaha	Peoria
No. of carlots composited	10	228	11	46	55
WHEAT:					
Test weight per bushel, lbs.	59.8	59.3	59.2	59.6	59.8
Weight per 1000 kernels, g.	30.8	26.8	25.1	26.5	25.9
Damaged kernels, pct.	----	----	0.5	0.4	2.4
Dark, hard, and vitreous kernels, pct.	67.0	46.0	54.0	43.0	42.0
Ash, pct.	1.46	1.65	1.57	1.60	1.74
Protein, pct.	13.0	11.1	12.5	11.2	11.2
Fat acidity	15	18	15	19	18
Sedimentation value	50	34	37	37	31
Pearling index	36	27	32	29	25
Flour yield, pct.	77.0	76.2	76.3	76.4	74.0
Milling score	88.6	84.6	87.0	88.4	84.4
FLOUR:					
Ash, pct.	0.47	0.51	0.48	0.48	0.48
Protein, pct.	11.8	10.1	11.5	10.1	10.0
Mixing time, min.	2.25	2.25	2.25	2.25	1.75
Water absorption, pct.	67	58	61	60	54
Mixogram characteristics:					
Development time, min.	2.25	3.00	3.00	3.00	3.00
Mixing tolerance, min.	1.25	2.00	2.00	2.25	1.25
BREAD:					
Loaf volume, cc.	810	780	855	760	763
Expected loaf volume, cc.	787	722	775	722	718
Grain	85	80	100	85	85
Crumb color	85	75	75	80	85

HARD RED WINTER WHEAT

Grade	No. 2 Hard Winter (cont).		No. 3 Hard Winter			
District	Wichita	AVERAGE	Kansas City	Omaha	Omaha[1/]	AVERAGE
		Total No.				Total No.
No. of carlots composited	23	373	176	19	7	202
WHEAT:						
Test weight per bushel, lbs.	59.5	59.4	57.5	57.8	57.0	57.5
Weight per 1000 kernels, g.	28.4	26.8	24.9	24.9	22.6	24.8
Damaged kernels, pct.	0.2	0.4	0.4	1.0	Trace	0.4
Dark, hard, and vitreous kernels, pct.	69.2	47.3	47.0	42.0	49.0	46.6
Ash, pct.	1.64	1.65	1.65	1.60	1.66	1.64
Protein, pct.	12.4	11.3	10.8	11.0	11.1	10.8
Fat acidity	15	18	17	20	16	17
Sedimentation value	45	35	32	33	33	32
Pearling index	33	28	26	28	28	26
Flour yield, pct.	77.0	76.0	74.6	75.1	73.6	74.6
Milling score	86.7	85.3	82.4	85.5	83.8	82.7
FLOUR:						
Ash, pct.	0.51	0.50	0.51	0.50	0.50	0.51
Protein, pct.	11.9	10.3	10.0	10.1	10.1	10.0
Mixing time, min.	2.50	2.19	2.25	2.00	2.00	2.22
Water absorption, pct.	59	58	59	61	61	59
Mixogram characteristics:						
Development time, min.	2.50	2.95	2.75	2.75	3.25	2.77
Mixing tolerance, min.	1.25	1.85	1.50	2.25	2.50	1.60
BREAD:						
Loaf volume, cc.	788	779	793	823	800	796
Expected loaf volume, cc.	791	729	718	722	722	718
Grain	80	82	85	85	90	85
Crumb color	80	78	65	80	85	67

[1/] Composite of samples of No. 4 Hard Winter Wheat

HARD RED WINTER WHEAT

Grade	No. 4 Hard Red Winter	No. 5 Hard Red Winter
District	Kansas City	Kansas City
No. of carlots composited	89	41
WHEAT:		
Test weight per bushel, lbs.	55.6	53.5
Weight per 1000 kernels, g.	23.3	20.0
Damaged kernels, pct.	----	0.7
Dark, hard, and vitreous kernels, pct.	53.0	55.0
Ash, pct.	1.72	1.70
Protein, pct.	11.0	11.5
Fat acidity	20	21
Sedimentation value	33	30
Pearling index	26	26
Flour yield, pct.	73.8	74.1
Milling score	80.8	80.8
FLOUR:		
Ash, pct.	0.53	0.54
Protein, pct.	10.2	10.5
Mixing time, min.	2.00	2.00
Water absorption, pct.	58	58
Mixogram characteristics:		
Development time, min.	3.00	3.00
Mixing tolerance, min.	2.50	1.75
BREAD:		
Loaf volume, cc.	800	805
Expected loaf volume, cc.	726	738
Grain	85	85
Crumb color	65	75

HARD RED WINTER WHEAT

Grade	No. 1 Yellow Hard Winter					
District	Chicago	Enid	Kansas City	Omaha	Peoria	Portland
No. of carlots composited	57	64	350	110	19	9
WHEAT:						
Test weight per bushel, lbs.	60.3	62.0	61.8	61.0	60.7	62.3
Weight per 1000 kernels, g.	26.5	34.1	32.7	29.2	27.2	29.4
Damaged kernels, pct.	0.7	0.2	----	----	1.5	----
Dark, hard, and vitreous kernels, pct.	36.0	30.0	31.0	27.0	28.0	20.0
Ash, pct.	1.61	1.56	1.62	1.59	1.66	1.47
Protein, pct.	10.9	11.0	10.4	10.4	10.5	8.3
Fat acidity	18	17	16	16	16	13
Sedimentation value	30	35	32	30	26	21
Pearling index	31	34	32	31	26	29
Flour yield, pct.	78.4	78.0	77.5	77.8	74.7	75.5
Milling score	88.8	90.7	87.5	88.1	85.4	84.8
FLOUR:						
Ash, pct.	0.51	0.46	0.49	0.50	0.48	0.51
Protein, pct.	9.9	10.0	9.6	9.5	9.3	7.3
Mixing time, min.	2.25	2.25	2.00	2.25	1.75	2.50
Water absorption, pct.	62	66	58	61	54	61
Mixogram characteristics:						
Development time, min.	2.75	3.00	3.00	2.75	2.50	0.75
Mixing tolerance, min.	2.75	2.75	1.50	2.00	1.75	0.50
BREAD:						
Loaf volume, cc.	763	740	745	770	715	585
Expected loaf volume, cc.	714	718	703	700	692	614
Grain	80	85	85	85	75	50
Crumb color	80	75	70	85	85	55
COOKIES:						
Cooky factor	4.62	4.82	4.55	4.92	4.62	4.60

HARD RED WINTER WHEAT

Grade	No. 1 Yellow Hard Winter (cont.)		
District	St. Louis	Wichita	AVERAGE Total No.
No. of carlots composited	45	6	660
WHEAT:			
Test weight per bushel, lbs.	61.5	62.2	61.5
Weight per 1000 kernels, g.	27.8	32.7	31.2
Damaged kernels, pct.	----	0.3	0.1
Dark, hard, and vitreous kernels, pct.	35.0	31.2	30.7
Ash, pct.	1.63	1.67	1.61
Protein, pct.	10.0	11.0	10.4
Fat acidity	18	16	16
Sedimentation value	27	36	31
Pearling index	28	33	31
Flour yield, pct.	77.1	77.0	77.5
Milling score	88.5	87.3	88.0
FLOUR:			
Ash, pct.	0.48	0.49	0.49
Protein, pct.	8.8	10.1	9.6
Mixing time, min.	2.25	2.50	2.11
Water absorption, pct.	60	59	60
Mixogram characteristics:			
Development time, min.	3.25	2.50	2.90
Mixing tolerance, min.	3.00	1.50	1.91
BREAD:			
Loaf volume, cc.	755	738	748
Expected loaf volume, cc.	673	722	702
Grain	80	75	83
Crumb color	80	75	75
COOKIES:			
Cooky factor	----	4.66	4.65

HARD RED WINTER WHEAT

Grade	No. 2 Yellow Hard Winter				
District	Kansas City	Omaha	Peoria	St. Louis	AVERAGE
					Total No.
No. of carlots composited	111	62	124	56	353
WHEAT:					
Test weight per bushel, lbs.	59.0	59.5	59.2	59.5	59.2
Weight per 1000 kernels, g.	28.1	27.1	26.6	27.5	27.3
Damaged kernels, pct.	0.6	0.2	2.0	1.6	1.2
Dark, hard, and vitreous kernels, pct.	32.0	31.0	20.0	30.0	27.3
Ash, pct.	1.68	1.60	1.70	1.66	1.67
Protein, pct.	10.5	10.7	11.1	11.1	10.8
Fat acidity	17	18	16	20	17
Sedimentation value	26	30	28	28	28
Pearling index	29	30	26	31	28
Flour yield, pct.	75.5	75.8	75.9	74.6	75.6
Milling score	84.3	87.4	85.6	85.2	85.4
FLOUR:					
Ash, pct.	0.51	0.48	0.50	0.49	0.50
Protein, pct.	9.5	9.8	9.9	9.7	9.7
Mixing time, min.	2.00	2.00	2.00	2.50	2.08
Water absorption, pct.	58	61	57	60	58
Mixogram characteristics:					
Development time, min.	3.00	3.00	2.50	3.00	2.82
Mixing tolerance, min.	1.75	2.50	1.75	1.75	1.88
BREAD:					
Loaf volume, cc.	743	773	740	795	755
Expected loaf volume, cc.	700	710	714	707	708
Grain	85	80	80	95	84
Crumb color	80	80	70	85	77
COOKIES:					
Cooky factor	4.55	4.68	4.61	4.40	4.57

HARD RED WINTER WHEAT

Grade	No. 3 Yellow Hard Winter		
District	Chicago	Kansas City	Omaha
No. of carlots composited	75	133	31
WHEAT:			
Test weight per bushel, lbs.	59.9	57.2	57.7
Weight per 1000 kernels, g.	26.8	24.0	24.6
Damaged kernels, pct.	2.0	0.9	1.2
Dark, hard, and vitreous kernels, pct.	36.0	30.0	20.5
Ash, pct.	1.68	1.67	1.63
Protein, pct.	11.0	10.6	11.1
Fat acidity	18	18	21
Sedimentation value	30	28	33
Pearling index	31	27	31
Flour yield, pct.	75.2	74.7	74.6
Milling score	86.3	83.1	85.3
FLOUR:			
Ash, pct.	0.49	0.51	0.48
Protein, pct.	9.7	9.7	10.0
Mixing time, min.	2.00	2.00	2.50
Water absorption, pct.	59	57	61
Mixogram characteristics:			
Development time, min.	2.50	3.50	3.00
Mixing tolerance, min.	2.50	2.25	2.50
BREAD:			
Loaf volume, cc.	780	770	805
Expected loaf volume, cc.	707	707	718
Grain	80	90	80
Crumb color	85	75	80
COOKIES:			
Cooky factor	5.05	4.51	4.93

Grade	No. 3 Yellow Hard Winter (cont.)			No. 4 Yellow Hard Winter
District	Omaha[1]	Peoria	AVERAGE Total No.	Kansas City
No. of carlots composited	15	67	321	75
WHEAT:				
Test weight per bushel, lbs.	56.4	57.8	58.0	55.5
Weight per 1000 kernels, g.	23.5	25.7	25.0	24.4
Damaged kernels, pct.	----	2.0	1.4	1.0
Dark, hard, and vitreous kernels, pct.	33.0	21.0	28.7	32.0
Ash, pct.	1.67	1.74	1.68	1.68
Protein, pct.	10.9	11.6	11.0	10.8
Fat acidity	23	16	18	20
Sedimentation value	32	31	30	30
Pearling index	29	27	28	26
Flour yield, pct.	75.4	75.5	75.0	73.9
Milling score	85.1	82.3	84.0	81.2
FLOUR:				
Ash, pct.	0.50	0.55	0.51	0.52
Protein, pct.	9.9	10.6	9.9	9.8
Mixing time, min.	2.50	2.00	2.07	2.00
Water absorption, pct.	60	59	58	57
Mixogram characteristics:				
Development time, min.	3.00	2.25	2.93	3.50
Mixing tolerance, min.	2.50	1.50	2.19	1.75
BREAD:				
Loaf volume, cc.	758	775	776	758
Expected loaf volume, cc.	714	741	715	710
Grain	85	85	85	80
Crumb color	70	75	78	70
COOKIES:				
Cooky factor	4.54	4.47	4.67	4.48

[1] Composite of samples of No. 4 Yellow Hard Winter.

WEIGHTED AVERAGE BY SUBCLASS
COMPARED WITH 1959 CROP

Subclass	Dark Hard Winter		Hard Winter		Yellow Hard Winter	
Crop year	1960	1959	1960	1959	1960	1959
No. of carlots composited	2731	3351	3867	2660	1409	3228
WHEAT:						
Test weight per bushel, lbs.	61.8	60.0	61.7	61.8	59.8	61.0
Weight per 1000 kernels, g.	29.1	28.6	30.2	30.2	28.4	29.8
Damaged kernels, pct.	0.1	0.1	0.2	0.2	0.7	0.1
Dark, hard, and vitreous kernels, pct.	83.1	87.2	54.6	46.0	29.5	26.8
Ash, pct.	15.4	1.70	1.59	1.62	1.64	1.31
Protein, pct.	12.3	13.6	11.0	10.8	10.7	10.2
Fat acidity	14	13	16	15	17	13
Sedimentation value	45	54	36	33	30	27
Pearling index	28	27	29	28	30	29
Flour yield, pct.	77.6	74.3	76.1	76.1	76.3	74.4
Milling score	87.1	82.5	86.4	84.5	86.1	85.8
FLOUR:						
Ash, pct.	0.50	0.51	0.49	0.51	0.50	0.46
Protein, pct.	11.5	12.6	10.2	10.0	9.7	9.4
Mixing time, min.	2.29	2.23	2.24	2.16	2.09	2.25
Water absorption, pct.	61	60	60	57	59	54
Mixogram characteristics:						
Development time, min.	2.49	3.16	2.76	2.93	2.92	3.17
Mixing tolerance, min.	1.51	1.65	1.67	1.40	1.96	1.96
BREAD:						
Loaf volume, cc.	801	826	766	730	757	723
Expected loaf volume, cc.	777	833	725	702	707	675
Grain	84	92	81	80	84	81
Crumb color	76	80	73	75	76	75
COOKIES:						
Cooky factor					4.48	5.17

HARD RED SPRING WHEAT

Grade	No. 1 Heavy Dark Northern Spring			
District	Duluth	Great Falls	Minneapolis	AVERAGE Total No.
No. of carlots composited	47	123	77	247
WHEAT:				
Test weight per bushel, lbs.	60.2	61.4	60.8	61.0
Weight per 1000 kernels, g.	32.0	25.6	30.5	28.3
Damaged kernels, pct.	0.2	0.4	Trace	0.2
Dark, hard, and vitreous kernels, pct.	94.0	94.0	89.0	92.4
Ash, pct.	1.59	1.51	1.75	1.60
Protein, pct.	12.8	14.3	13.8	13.8
Fat acidity	15	14	11	13
Sedimentation value	50	69	54	61
Pearling index	30	32	34	30
Flour yield, pct.	77.1	78.1	75.4	77.1
Milling score	86.1	88.9	85.0	87.2
FLOUR:				
Ash, pct.	0.53	0.49	0.52	0.51
Protein, pct.	12.2	13.4	13.2	13.1
Mixing time, min.	2.50	2.25	2.50	2.38
Water absorption, pct.	64	65	65	65
Mixogram characteristics:				
Development time, min.	3.00	3.00	2.75	2.92
Mixing tolerance, min.	3.00	2.25	2.50	2.47
BREAD:				
Loaf volume, cc.	878	930	880	904
Expected loaf volume, cc.	802	848	840	837
Grain	90	95	85	91
Crumb color	80	85	90	86

HARD RED SPRING WHEAT

Grade	No. 1 Dark Northern Spring			
District	Duluth	Great Falls	Minneapolis	AVERAGE Total No.
No. of carlots composited	126	282	138	546
WHEAT:				
Test weight per bushel, lbs.	58.7	59.0	59.0	58.9
Weight per 1000 kernels, g.	28.4	21.8	28.2	24.9
Damaged kernels, pct.	----	0.2	0.4	0.2
Dark, hard, and vitreous kernels, pct.	95.0	96.0	83.0	92.5
Ash, pct.	1.61	1.58	1.72	1.62
Protein, pct.	13.9	15.4	14.1	14.7
Fat acidity	11	14	14	13
Sedimentation value	62	72	51	64
Pearling index	32	33	34	33
Flour yield, pct.	76.2	74.8	76.9	75.6
Milling score	85.4	85.6	86.6	85.8
FLOUR:				
Ash, pct.	0.52	0.50	0.52	0.51
Protein, pct.	13.0	14.7	13.4	14.0
Mixing time, min.	2.75	2.50	2.50	2.56
Water absorption, pct.	64	63	64	63
Mixogram characteristics:				
Development time, min.	3.00	2.25	3.00	2.61
Mixing tolerance, min.	3.25	3.00	2.50	2.93
BREAD:				
Loaf volume, cc.	958	975	873	945
Expected loaf volume, cc.	833	898	848	870
Grain	100	90	85	91
Crumb color	100	75	85	83

HARD RED SPRING WHEAT

Grade	No. 2 Dark Northern Spring				
	Duluth	Great Falls	Great Falls 1/	Minneapolis	AVERAGE Total No.
No. of carlots composited	177	154	16	128	475
WHEAT:					
Test weight per bushel, lbs.	58.1	57.6	60.0	57.6	57.9
Weight per 1000 kernels, g.	26.1	20.0	22.3	26.0	24.0
Damaged kernels, pct.	----	0.2	0.7	0.7	0.3
Dark, hard, and vitreous kernels, pct.	87.5	97.0	94.0	84.0	89.8
Ash, pct.	1.57	1.63	1.55	1.81	1.65
Protein, pct.	14.5	15.9	15.2	14.6	15.0
Fat acidity	14	13	12	13	13
Sedimentation value	68	71	73	60	67
Pearling index	33	31	32	32	32
Flour yield, pct.	77.2	73.8	75.7	76.0	75.7
Milling score	87.4	83.4	86.7	85.3	85.5
FLOUR:					
Ash, pct.	0.52	0.51	0.49	0.53	0.52
Protein, pct.	13.6	15.3	14.1	13.7	14.2
Mixing time, min.	2.75	2.50	2.50	2.50	2.59
Water absorption, pct.	65	64	66	66	65
Mixogram characteristics:					
Development time, min.	2.75	3.25	2.25	3.00	2.96
Mixing tolerance, min.	2.50	2.25	2.00	2.75	2.47
BREAD:					
Loaf volume, cc.	950	970	990	865	935
Expected loaf volume, cc.	856	920	875	860	878
Grain	100	95	100	85	94
Crumb color	95	85	80	75	86

1/ Graded No. 2 because of foreign material.

HARD RED SPRING WHEAT

Grade	No. 3 Dark Northern Spring			
District	Great Falls	Great Falls 1/	Minneapolis	AVERAGE
				Total No.
No. of carlots composited	168	122	187	477
WHEAT:				
Test weight per bushel, lbs.	56.4	57.2	56.2	56.5
Weight per 1000 kernels, g.	18.9	20.2	24.5	21.4
Damaged kernels, pct.	Trace	Trace	0.8	0.3
Dark, hard, and vitreous kernels, pct.	98.0	98.0	90.0	94.9
Ash, pct.	1.65	1.64	1.71	1.67
Protein, pct.	17.0	16.2	14.9	16.0
Fat acidity	13	12	12	12
Sedimentation value	72	71	60	67
Pearling index	30	30	33	31
Flour yield, pct.	74.4	75.0	76.0	75.2
Milling score	83.4	84.0	82.8	83.3
FLOUR:				
Ash, pct.	0.52	0.53	0.57	0.54
Protein, pct.	15.8	15.2	14.2	15.0
Mixing time, min.	2.50	2.50	3.00	2.70
Water absorption, pct.	66	66	65	66
Mixogram characteristics:				
Development time, min.	2.75	2.75	2.75	2.75
Mixing tolerance, min.	2.00	2.00	3.00	2.39
BREAD:				
Loaf volume, cc.	1010	990	958	984
Expected loaf volume, cc.	940	917	878	910
Grain	90	85	95	91
Crumb color	80	75	85	81

1/ Graded No. 3 on account of shrunken and broken kernels.

Grade	No. 4 Dark Northern Spring			
District	Duluth	Great Falls	Minneapolis	AVERAGE
No. of carlots composited	52	35	58	Total No. 145
WHEAT:				
Test weight per bushel, lbs.	54.2	54.8	54.4	54.4
Weight per 1000 kernels, g.	22.2	18.0	23.4	21.7
Damaged kernels, pct.	0.1	0.2	1.4	0.6
Dark, hard, and vitreous kernels, pct.	88.0	99.4	85.0	89.6
Ash, pct.	1.65	1.68	1.70	1.68
Protein, pct.	15.5	17.2	14.9	15.7
Fat acidity	13	8	13	12
Sedimentation value	68	73	67	69
Pearling index	32	30	32	32
Flour yield, pct.	76.3	73.9	75.4	75.4
Milling score	83.2	82.0	83.2	82.9
FLOUR:				
Ash, pct.	0.58	0.54	0.56	0.56
Protein, pct.	14.6	16.2	14.4	14.9
Mixing time, min.	2.50	2.50	2.75	2.60
Water absorption, pct.	65	64	65	65
Mixogram characteristics:				
Development time, min.	3.00	3.25	3.00	3.06
Mixing tolerance, min.	2.00	2.50	3.00	2.52
BREAD:				
Loaf volume, cc.	988	1025	975	992
Expected loaf volume, cc.	894	955	886	906
Grain	100	90	95	96
Crumb color	80	75	85	81

HARD RED SPRING WHEAT

Grade District	No. 5 Dark Northern Spring Duluth	 Minneapolis	AVERAGE Total No.
No. of carlots composited	20	8	28
WHEAT:			
Test weight per bushel, lbs.	52.2	52.2	52.2
Weight per 1000 kernels, g.	21.2	23.4	21.8
Damaged kernels, pct.	0.7	2.3	1.2
Dark, hard, and vitreous kernels, pct.	96.0	92.0	94.8
Ash, pct.	1.71	1.73	1.72
Protein, pct.	15.5	15.5	15.5
Fat acidity	13	14	13
Sedimentation value	72	70	71
Pearling index	31	29	30
Flour yield, pct.	74.3	74.4	74.3
Milling score	80.3	81.1	80.5
FLOUR:			
Ash, pct.	0.57	0.58	0.57
Protein, pct.	14.7	14.6	14.7
Mixing time, min.	2.50	3.00	2.64
Water absorption, pct.	63	66	64
Mixogram characteristics:			
Development time, min.	3.50	3.75	3.57
Mixing tolerance, min.	2.50	2.50	2.50
BREAD:			
Loaf volume, cc.	960	963	961
Expected loaf volume, cc.	898	894	897
Grain	95	95	95
Crumb color	75	100	82

HARD RED SPRING WHEAT

Grade	No. 1 Northern Spring			No. 2 Northern Spring		
District	Duluth	Minneapolis	AVERAGE	Duluth	Minneapolis	AVERAGE
			Total No.			Total No.
No. of carlots composited	34	38	72	43	56	99
WHEAT:						
Test weight per bushel, lbs.	58.5	58.5	58.5	57.6	57.7	57.6
Weight per 1000 kernels, g.	31.5	32.4	32.0	30.6	30.1	30.3
Damaged kernels, pct.	0.1	0.7	0.4	0.0	0.8	0.4
Dark, hard, and vitreous kernels, pct.	65.5	52.0	58.8	56.0	68.0	62.8
Ash, pct.	1.65	1.78	1.72	1.63	1.86	1.76
Protein, pct.	12.2	12.8	12.5	12.7	13.4	13.1
Fat acidity	13	16	14	13	15	14
Sedimentation value	44	46	45	54	42	47
Pearling index	32	34	33	33	34	34
Flour yield, pct.	77.3	78.4	77.9	77.4	77.4	77.4
Milling score	86.2	87.5	86.9	87.8	86.0	86.8
FLOUR:						
Ash, pct.	0.54	0.56	0.55	0.52	0.56	0.54
Protein, pct.	11.5	12.5	12.0	12.0	12.5	12.3
Mixing time, min.	3.00	2.75	2.87	2.75	2.75	2.75
Water absorption, pct.	64	63	63	65	63	64
Mixogram characteristics:						
Development time, min.	3.00	3.75	3.40	3.25	3.00	3.11
Mixing tolerance, min.	3.00	2.50	2.74	2.50	3.00	2.78
BREAD:						
Loaf volume, cc.	890	885	887	920	900	909
Expected loaf volume, cc.	775	814	796	794	814	805
Grain	95	90	92	100	90	94
Crumb color	80	80	80	80	85	83

HARD RED SPRING WHEAT

Grade	No. 3 Northern Spring			No. 4 Northern Spring
District	Duluth	Minneapolis	AVERAGE	Minneapolis
No. of carlots composited	29	44	Total No. 73	9
WHEAT:				
Test weight per bushel, lbs.	56.7	56.5	56.6	53.7
Weight per 1000 kernels, g.	28.2	29.4	28.9	27.0
Damaged kernels, pct.	0.5	1.0	0.8	3.4
Dark, hard, and vitreous kernels, pct.	61.1	63.0	62.2	68.0
Ash, pct.	1.63	1.82	1.74	1.77
Protein, pct.	12.8	13.7	13.3	13.8
Fat acidity	14	13	13	11
Sedimentation value	44	44	44	47
Pearling index	33	35	34	38
Flour yield, pct.	77.5	78.2	77.9	77.9
Milling score	87.6	87.4	87.5	86.7
FLOUR:				
Ash, pct.	0.52	0.55	0.54	0.54
Protein, pct.	12.1	12.7	12.5	13.1
Mixing time, min.	2.50	2.50	2.50	2.75
Water absorption, pct.	64	63	63	65
Mixogram characteristics:				
Development time, min.	3.25	3.50	3.40	3.75
Mixing tolerance, min.	3.00	3.00	3.00	3.00
BREAD:				
Loaf volume, cc.	915	920	918	915
Expected loaf volume, cc.	798	821	810	836
Grain	100	95	97	95
Crumb color	85	95	91	90

HARD RED SPRING WHEAT

WEIGHTED AVERAGE BY SUBCLASS
COMPARED WITH 1959 CROP

Subclass	Dark Northern Spring		Northern Spring	
Crop year	1960	1959	1960	1959
No. of carlots composited	1918	2166	253	214
WHEAT:				
Test weight per bushel, lbs.	57.9	57.9	57.4	56.8
Weight per 1000 kernels, g.	24.0	26.8	30.3	32.2
Damaged kernels, pct.	0.3	0.5	0.6	0.8
Dark, hard, and vitreous kernels, pct.	92.2	94.7	61.6	57.9
Ash, pct.	1.64	1.57	1.74	1.68
Protein, pct.	15.1	14.9	13.0	13.2
Fat acidity	13	14	14	15
Sedimentation value	66	69	46	58
Pearling index	32	31	34	33
Flour yield, pct.	75.7	75.6	77.7	76.2
Milling score	85.0	84.8	87.0	84.8
FLOUR:				
Ash, pct.	0.52	0.52	0.54	0.52
Protein, pct.	14.3	14.2	12.3	12.5
Mixing time, min.	2.58	2.49	2.71	2.58
Water absorption, pct.	65	62	64	62
Mixogram characteristics:				
Development time, min.	2.82	3.19	3.30	3.49
Mixing tolerance, min.	2.59	2.35	2.84	2.60
BREAD:				
Loaf volume, cc.	951	884	906	802
Expected loaf volume, cc.	881	916	805	829
Grain	92	88	94	86
Crumb color	78	80	85	82

SOFT RED WINTER WHEAT

Grade	No. 1 Red Winter				
District	Baltimore	Buffalo	Indianapolis	Louisville	Peoria
No. of carlots composited	125	94	82	45	32
WHEAT:					
Test weight per bushel, lbs.	61.0	61.0	61.2	62.0	60.2
Weight per 1000 kernels, g.	33.8	33.8	32.4	34.2	34.2
Damaged kernels, pct.	0.3	0.9	0.5	0.2	1.0
Ash, pct.	1.61	1.66	1.67	1.66	1.66
Protein, pct.	10.0	10.0	10.4	10.6	10.5
Fat acidity	14	16	16	15	14
Sedimentation value	20	12	16	17	15
Pearling index	42	48	47	40	43
Flour yield, pct.	75.9	75.0	75.8	76.9	75.7
Milling score	86.3	86.5	88.4	86.5	86.9
FLOUR:					
Ash, pct.	0.47	0.43	0.44	0.45	0.44
Protein, pct.	8.8	8.6	8.7	9.2	9.2
Mixing time, min.	1.75	2.00	2.25	2.00	2.00
Water absorption, pct.	62	57	55	51	50
BREAD:					
Loaf volume, cc.	658	700	645	643	665
Expected loaf volume, cc.	673	665	669	688	688
Grain	70	75	65	70	70
Crumb color	70	80	70	70	70
COOKIES:					
Cooky factor	6.75	5.39	5.56	4.94	5.48

SOFT RED WINTER WHEAT

Grade	No. 1 Red Winter (cont.)			No. 1 Red Winter Garlicky		
District	St. Louis	Toledo	AVERAGE Total No.	Balti-more	Phila-delphia	AVERAGE Total No.
No. of carlots composited	35	90	503	160	274	434
WHEAT:						
Test weight per bushel, lbs.	61.6	60.4	61.0	60.7	61.5	61.2
Weight per 1000 kernels, g.	36.3	34.8	34.0	37.9	36.9	37.3
Damaged kernels, pct.	----	0.8	0.5	0.6	1.2	1.0
Ash, pct.	1.66	1.60	1.64	1.63	1.62	1.62
Protein, pct.	10.7	9.8	10.2	9.8	11.1	10.6
Fat acidity	16	17	15	15	19	18
Sedimentation value	14	14	16	14	24	20
Pearling index	47	47	45	44	48	46
Flour yield, pct.	76.7	75.2	75.7	76.9	76.0	76.3
Milling score	87.2	86.9	86.9	87.3	88.6	88.1
FLOUR:						
Ash, pct.	0.45	0.43	0.44	0.46	0.44	0.45
Protein, pct.	9.2	8.6	8.8	8.6	10.0	9.5
Mixing time, min.	2.25	2.25	2.04	1.75	2.50	2.22
Water absorption, pct.	55	55	56	60	56	57
BREAD:						
Loaf volume, cc.	665	665	664	605	705	668
Expected loaf volume, cc.	688	665	673	665	718	698
Grain	65	65	69	65	75	71
Crumb color	80	85	75	65	90	81
COOKIES:						
Cooky factor	5.45	5.38	5.72	5.40	5.14	5.24

SOFT RED WINTER WHEAT

Grade	No. 2 Red Winter				
District	Buffalo	Indianapolis	Louisville	Peoria	St. Louis
No. of carlots composited	168	43	39	173	35
WHEAT:					
Test weight per bushel, lbs.	59.6	59.5	59.2	59.7	59.6
Weight per 1000 kernels, g.	35.0	32.1	33.9	30.4	32.5
Damaged kernels, pct.	1.4	1.1	1.0	1.2	0.5
Ash, pct.	1.63	1.67	1.70	1.70	1.67
Protein, pct.	9.9	10.5	10.6	10.5	10.7
Fat acidity	15	18	16	14	16
Sedimentation value	12	15	16	14	15
Pearling index	52	50	43	43	50
Flour yield, pct.	75.6	75.2	75.9	74.3	75.9
Milling score	84.9	85.5	86.7	85.2	87.8
FLOUR:					
Ash, pct.	0.47	0.45	0.44	0.43	0.42
Protein, pct.	8.7	9.0	9.4	9.0	9.3
Mixing time, min.	2.00	2.25	1.75	1.75	2.25
Water absorption, pct.	57	55	50	49	56
BREAD:					
Loaf volume, cc.	715	705	685	715	740
Expected loaf volume, cc.	669	680	696	680	692
Grain	70	65	70	75	70
Crumb color	80	70	75	75	85
COOKIES:					
Cooky factor	4.94	5.36	5.54	5.28	5.53

SOFT RED WINTER WHEAT

Grade	No. 2 Red Winter (cont.)		No. 2 Red Winter Garlicky		
District	Toledo	AVERAGE	Baltimore	Philadelphia	AVERAGE
		Total No.			Total No.
No. of carlots composited	40	498	140	327	467
WHEAT:					
Test weight per bushel, lbs.	58.6	59.5	59.4	59.5	59.5
Weight per 1000 kernels, g.	35.1	32.9	36.7	38.2	37.8
Damaged kernels, pct.	1.0	1.2	0.8	1.1	1.0
Ash, pct.	1.66	1.67	1.65	1.69	1.68
Protein, pct.	10.3	10.3	10.2	9.9	10.0
Fat acidity	17	15	16	19	18
Sedimentation value	11	13	17	13	14
Pearling index	52	48	44	48	47
Flour yield, pct.	77.5	75.3	75.5	74.0	74.4
Milling score	89.4	85.8	86.3	86.2	86.2
FLOUR:					
Ash, pct.	0.42	0.44	0.45	0.44	0.44
Protein, pct.	8.8	8.9	8.8	8.4	8.5
Mixing time, min.	2.25	1.95	1.75	2.50	2.28
Water absorption, pct.	55	53	62	55	57
BREAD:					
Loaf volume, cc.	728	714	675	688	684
Expected loaf volume, cc.	673	678	673	657	662
Grain	70	71	70	70	70
Crumb color	85	78	70	90	84
COOKIES:					
Cooky factor	5.39	5.22	5.63	5.37	5.45

SOFT RED WINTER WHEAT

Grade	No. 3 Red Winter				No. 3 Red Winter, Garlicky
District	Buffalo	Louisville	Peoria	AVERAGE	Philadelphia
				Total No.	
No. of carlots composited	55	22	44	121	134
WHEAT:					
Test weight per bushel, lbs.	57.7	57.5	57.8	57.7	57.6
Weight per 1000 kernels, g.	34.7	33.4	30.6	33.0	37.7
Damaged kernels, pct.	1.5	1.3	1.2	1.4	1.4
Ash, pct.	1.60	1.63	1.72	1.65	1.63
Protein, pct.	10.0	10.3	10.5	10.2	9.8
Fat acidity	15	14	15	15	20
Sedimentation value	11	15	15	13	12
Pearling index	53	46	44	48	58
Flour yield, pct.	75.1	74.8	74.9	75.0	74.6
Milling score	85.3	85.8	87.1	86.0	86.7
FLOUR:					
Ash, pct.	0.45	0.43	0.41	0.43	0.42
Protein, pct.	8.6	8.9	9.0	8.8	8.5
Mixing time, min.	2.00	2.00	2.00	2.00	2.50
Water absorption, pct.	56	50	49	52	55
BREAD:					
Loaf volume, cc.	678	705	675	682	675
Expected loaf volume, cc.	665	677	680	673	661
Grain	65	70	70	68	70
Crumb color	80	75	80	79	85
COOKIES:					
Cooky factor	5.38	4.76	5.49	5.31	5.87

WEIGHTED AVERAGE BY SUBCLASS
COMPARED WITH 1959 CROP

Subclass	Red Winter	
Crop year	1960	1959
No. of carlots composited	2157	1692
WHEAT:		
Test weight per bushel, lbs.	60.0	59.7
Weight per 1000 kernels, g.	35.4	35.9
Damaged kernels, pct.	1.0	0.9
Ash, pct.	1.65	1.68
Protein, pct.	10.2	10.5
Fat acidity	17	17
Sedimentation value	15	14
Pearling index	47	46
Flour yield, pct.	75.4	74.0
Milling score	86.7	82.4
FLOUR:		
Ash, pct.	0.44	0.47
Protein, pct.	8.9	9.3
Mixing time, min.	2.13	1.86
Water absorption, pct.	56	55
BREAD:		
Loaf volume, cc.	683	695
Expected loaf volume, cc.	676	672
Grain	70	78
Crumb color	80	75
COOKIES:		
Cooky factor	5.44	5.14

WHITE WHEAT

Grade	No. 1 Soft White			
District	Buffalo	Portland	Spokane	AVERAGE Total No.
No. of carlots composited	73	331	59	463
WHEAT:				
Test weight per bushel, lbs.	60.5	61.0	61.5	61.0
Weight per 1000 kernels, g.	36.7	37.5	35.1	37.1
Damaged kernels, pct.	0.7	0.1	0.0	0.2
Hard kernels, pct.	12.6	20.0	27.0	19.7
Ash, pct.	1.53	1.59	1.47	1.56
Protein, pct.	8.9	9.0	9.0	9.0
Fat acidity	15	12	10	12
Sedimentation value	9	16	16	15
Pearling index	45	40	44	41
Flour yield, pct.	77.3	74.4	77.1	75.2
Milling score	91.0	82.4	88.3	84.5
FLOUR:				
Ash, pct.	0.42	0.51	0.45	0.49
Protein, pct.	7.5	7.5	7.6	7.5
Mixing time, min.	1.50	2.25	1.50	2.04
Water absorption, pct.	54	56	53	55
BREAD:				
Loaf volume, cc.	673	595	575	605
Expected loaf volume, cc.	622	622	626	623
Grain	60	50	50	52
Crumb color	60	60	50	59
COOKIES:				
Cooky factor	5.43	4.86	5.52	5.03

WHITE WHEAT

Grade	No. 2 Soft White				
District	Buffalo	Portland	Spokane	Toledo	AVERAGE
No. of carlots composited	120	230	67	35	Total No. 452
WHEAT:					
Test weight per bushel, lbs.	59.4	59.6	59.2	59.0	59.4
Weight per 1000 kernels, g.	35.0	33.6	30.9	35.4	33.7
Damaged kernels, pct.	0.4	0.5	0.1	0.5	0.4
Hard kernels, pct.	4.4	18.8	26.0	4.9	15.0
Ash, pct.	1.59	1.62	1.53	1.45	1.58
Protein, pct.	9.0	9.8	9.8	8.4	9.5
Fat acidity	16	12	10	18	13
Sedimentation value	9	14	18	8	13
Pearling index	49	45	50	50	47
Flour yield, pct.	76.4	75.8	74.3	77.8	75.9
Milling score	88.2	83.4	84.3	90.2	85.3
FLOUR:					
Ash, pct.	0.45	0.51	0.46	0.43	0.48
Protein, pct.	7.7	8.5	8.3	7.4	8.2
Mixing time, min.	1.50	2.00	1.50	1.50	1.75
Water absorption, pct.	54	57	54	54	56
BREAD:					
Loaf volume, cc.	625	675	640	653	655
Expected loaf volume, cc.	630	661	653	618	648
Grain	50	60	50	55	55
Crumb color	55	65	60	60	61
COOKIES:					
Cooky factor	5.74	5.23	5.66	5.58	5.46

WHITE WHEAT

Grade	No. 3 Soft White			
District	Buffalo	Portland	Toledo	AVERAGE
No. of carlots composited	55	35	31	Total No. 121
WHEAT:				
Test weight per bushel, lbs.	57.6	57.8	57.7	57.7
Weight per 1000 kernels, g.	35.8	31.7	35.5	34.5
Damaged kernels, pct.	2.3	----	2.0	1.6
Hard kernels, pct.	1.6	10.0	2.9	4.4
Ash, pct.	1.49	1.61	1.52	1.53
Protein, pct.	8.9	9.4	8.8	9.0
Fat acidity	15	12	18	15
Sedimentation value	8	14	8	10
Pearling index	52	47	52	50
Flour yield, pct.	75.7	76.3	76.7	76.1
Milling score	86.9	84.8	88.9	86.8
FLOUR:				
Ash, pct.	0.44	0.50	0.43	0.45
Protein, pct.	7.5	8.0	7.5	7.6
Mixing time, min.	1.50	2.00	1.50	1.64
Water absorption, pct.	54	58	54	55
BREAD:				
Loaf volume, cc.	615	608	663	625
Expected loaf volume, cc.	622	642	622	628
Grain	50	55	55	53
Crumb color	50	55	60	54
COOKIES:				
Cooky factor	5.93	5.13	5.64	5.62

WHITE WHEAT

Grade	No. 1 White Club		
District	Portland	Spokane	AVERAGE
			Total No.
No. of carlots composited	314	35	349
WHEAT:			
Test weight per bushel, lbs.	60.7	60.5	60.7
Weight per 1000 kernels, g.	30.8	30.2	30.7
Damaged kernels, pct.	0.1	----	0.1
Hard kernels, pct.	17.3	24.4	18.0
Ash, pct.	1.38	1.44	1.39
Protein, pct.	7.9	8.4	8.0
Fat acidity	13	11	13
Sedimentation value	13	11	13
Pearling index	46	44	46
Flour yield, pct.	79.1	77.6	78.9
Milling score	90.8	89.2	90.6
FLOUR:			
Ash, pct.	0.46	0.46	0.46
Protein, pct.	6.8	7.3	7.1
Mixing time, min.	1.50	1.50	1.50
Water absorption, pct.	54	53	54
BREAD:			
Loaf volume, cc.	570	550	568
Expected loaf volume, cc.	596	614	598
Grain	50	45	49
Crumb color	50	45	49
COOKIES:			
Cooky factor	5.34	5.54	5.36

WHITE WHEAT

Grade	No. 2 White Club		
District	Portland	Spokane	AVERAGE Total No.
No. of carlots composited	198	68	266
WHEAT:			
Test weight per bushel, lbs.	59.8	59.3	59.7
Weight per 1000 kernels, g.	27.6	30.7	28.4
Damaged kernels, pct.	0.1	0.1	0.1
Hard kernels, pct.	15.2	16.2	15.6
Ash, pct.	1.49	1.46	1.48
Protein, pct.	8.5	8.5	8.5
Fat acidity	13	11	12
Sedimentation value	7	6	7
Pearling index	51	49	50
Flour yield, pct.	77.3	77.6	77.4
Milling score	88.4	88.5	88.4
FLOUR:			
Ash, pct.	0.47	0.48	0.47
Protein, pct.	7.0	7.8	7.2
Mixing time, min.	1.50	1.50	1.50
Water absorption, pct.	54	53	54
BREAD:			
Loaf volume, cc.	573	533	563
Expected loaf volume, cc.	604	634	612
Grain	50	40	47
Crumb color	50	45	49
COOKIES:			
Cooky factor	5.98	5.55	5.87

WHITE WHEAT

Grade	No. 3 White Club		
District	Portland	Spokane	AVERAGE
			Total No.
No. of carlots composited	17	32	49
WHEAT:			
Test weight per bushel, lbs.	57.5	57.7	57.6
Weight per 1000 kernels, g.	27.8	25.5	26.3
Damaged kernels, pct.	0.1	0.1	0.1
Hard kernels, pct.	6.4	20.9	15.9
Ash, pct.	1.42	1.53	1.49
Protein, pct.	8.2	9.3	8.9
Fat acidity	12	9	10
Sedimentation value	6	10	9
Pearling index	58	52	54
Flour yield, pct.	77.8	78.7	78.4
Milling score	89.9	88.2	88.8
FLOUR:			
Ash, pct.	0.46	0.50	0.49
Protein, pct.	6.8	7.9	7.5
Mixing time, min.	1.50	1.50	1.50
Water absorption, pct.	54	53	53
BREAD:			
Loaf volume, cc.	588	560	570
Expected loaf volume, cc.	596	638	623
Grain	50	40	43
Crumb color	50	45	47
COOKIES:			
Cooky factor	5.70	5.82	5.78

WHITE WHEAT

Grade District	No. 1 Western White Portland	No. 2 Western White Portland	No. 3 Western White Portland
No. of carlots composited	276	107	23
WHEAT:			
Test weight per bushel, lbs.	61.1	59.3	57.8
Weight per 1000 kernels, g.	31.1	30.3	27.4
Damaged kernels, pct.	0.1	0.3	0.1
Hard kernels, pct.	17.5	17.0	10.4
Ash, pct.	1.47	1.47	1.51
Protein, pct.	8.8	8.9	9.0
Fat acidity	15	15	13
Sedimentation value	10	9	9
Pearling index	44	47	50
Flour yield, pct.	76.7	76.7	76.7
Milling score	86.3	86.3	86.6
FLOUR:			
Ash, pct.	0.49	0.49	0.49
Protein, pct.	7.5	7.8	7.9
Mixing time, min.	1.50	1.50	1.50
Water absorption, pct.	56	54	55
BREAD:			
Loaf volume, cc.	618	580	630
Expected loaf volume, cc.	622	634	638
Grain	60	50	55
Crumb color	60	50	55
COOKIES:			
Cooky factor	5.45	5.58	5.69

WHITE WHEAT[1/]

WEIGHTED AVERAGE BY SUBCLASS
COMPARED WITH 1959 CROP

Subclass	Soft White		White Club		Western White	
Crop year	1960	1959	1960	1959	1960	1959
No. of carlots composited	1036	851	664	480	406	278
WHEAT:						
Test weight per bushel, lbs.	59.9	59.8	60.0	60.6	60.4	60.9
Weight per 1000 kernels, g.	35.3	36.8	29.5	31.9	30.7	32.1
Damaged kernels, pct.	0.4	0.7	0.1	0.2	0.2	0.1
Hard kernels, pct.	15.8	16.8	16.9	15.5	17.0	32.8
Ash, pct.	1.57	1.54	1.43	1.41	1.47	1.44
Protein, pct.	9.2	9.7	8.2	8.4	8.8	9.5
Fat acidity	13	16	12	13	15	13
Sedimentation value	13	14	10	5	10	10
Pearling index	45	41	48	43	45	40
Flour yield, pct.	75.6	75.6	78.3	78.0	76.7	76.8
Milling score	85.1	84.3	89.6	80.5	86.3	84.5
FLOUR:						
Ash, pct.	0.48	0.49	0.47	0.43	0.49	0.52
Protein, pct.	7.8	8.4	7.2	7.1	7.6	8.0
Mixing time, min.	1.87	1.72	1.50	1.23	1.50	1.69
Water absorption, pct.	55	52	54	52	55	54
BREAD:						
Loaf volume, cc.	629	660	566	555	609	634
Expected loaf volume, cc.	634	623	605	560	626	604
Grain	53	67	48	52	57	65
Crumb color	59	74	49	64	57	71
COOKIES:						
Cooky factor	5.29	5.05	5.60	5.09	5.50	5.24

[1/] No samples of Hard White Wheat were submitted.

DURUM WHEAT

Grade	No. 1 Hard Amber Durum			No. 2 Hard Amber Durum
District	Duluth	Minneapolis	AVERAGE	Duluth
			Total No.	
No. of carlots composited	33	43	76	39
WHEAT:				
Test weight per bushel, lbs.	61.1	61.5	61.3	60.7
Weight per 1000 kernels, g.	34.2	33.4	33.7	32.1
Damaged kernels, pct.	0.6	0.5	0.5	1.5
Hard and vitreous kernels of amber color, pct.	87.5	88.0	87.8	87.5
Ash, pct.	1.54	1.49	1.51	1.52
Protein, pct.	14.2	14.5	14.4	14.3
Fat acidity	11	10	10	11
Semolina yield, pct.	46.7	50.2	48.7	49.5
Carotenoid content, p.p.m.	5.6	5.6	5.6	5.7
SEMOLINA:				
Ash, pct.	0.64	0.67	0.66	0.73
Protein, pct.	13.1	13.6	13.4	13.6
Carotenoid content, p.p.m.	5.0	5.1	5.0	5.1
MACARONI:				
Visual appearance	slightly pale yellow	slightly pale yellow		clear yellow
Numerical rating	3	3	3	2

Grade	No. 3 Hard Amber Durum			No. 4 Hard Amber Durum
District	Duluth	Minneapolis	AVERAGE	Duluth
No. of carlots composited	133	33	Total No. 166	32
WHEAT:				
Test weight per bushel, lbs.	61.0	60.6	60.9	60.0
Weight per 1000 kernels, g.	34.2	33.0	34.0	31.5
Damaged kernels, pct.	1.0	0.8	1.0	----
Hard and vitreous kernels of amber color, pct.	89.5	88.0	89.2	81.0
Ash, pct.	1.51	1.56	1.51	1.51
Protein, pct.	14.4	14.6	14.4	15.4
Fat acidity	10	12	10	9
Semolina yield, pct.	45.9	47.2	46.2	45.4
Carotenoid content, p.p.m.	5.7	5.7	5.7	5.6
SEMOLINA:				
Ash, pct.	0.68	0.66	0.68	0.65
Protein, pct.	13.4	13.6	13.4	14.1
Carotenoid content, p.p.m.	5.0	5.0	5.0	5.1
MACARONI:				
Visual appearance	clear yellow	slightly pale yellow		clear yellow
Numerical rating	2	3	2	2

DURUM WHEAT

Grade	No. 3 Amber Durum	No. 3 Durum	No. 4 Durum
District	Duluth	Duluth	Duluth
No. of carlots composited	35	28	24
WHEAT:			
Test weight per bushel, lbs.	61.0	60.4	60.2
Weight per 1000 kernels, g.	33.6	36.1	33.5
Damaged kernels, pct.	3.4	3.3	7.3
Hard and vitreous kernels of amber color, pct.	64.0	49.5	46.5
Ash, pct.	1.53	1.51	1.57
Protein, pct.	13.0	12.2	13.0
Fat acidity	12	10	10
Semolina yield, pct.	47.1	44.2	44.8
Carotenoid content, p.p.m.	5.4	5.6	5.6
SEMOLINA:			
Ash, pct.	0.68	0.67	0.72
Protein, pct.	12.4	11.6	12.6
Carotenoid content, p.p.m.	4.8	5.1	5.1
MACARONI:			
Visual appearance	clear yellow	clear yellow	slightly pale yellow
Numerical rating	2	2	3

WEIGHTED AVERAGE BY SUBCLASS
COMPARED WITH 1959 CROP

Subclass	Hard Amber Durum		Amber Durum[1]		Durum
Crop year	1960	1959	1960	1959	1960[2]
No. of carlots composited	313	346	35	85	52
WHEAT:					
Test weight per bushel, lbs.	60.8	61.0	61.0	60.5	60.3
Weight per 1000 kernels, g.	33.4	35.8	33.6	36.6	34.9
Damaged kernels, pct.	0.8	1.0	3.4	5.1	5.1
Hard and vitreous kernels of amber color, pct.	87.8	84.1	64.0	68.0	48.1
Ash, pct.	1.52	1.50	1.53	1.50	1.54
Protein, pct.	14.5	14.3	13.0	13.2	12.6
Fat acidity	10	10	12	10	10
Semolina yield, pct.	47.1	52.6	47.1	52.8	44.5
Carotenoid content, p.p.m.	5.7	5.7	5.4	5.5	5.6
SEMOLINA:					
Ash, pct.	0.68	0.66	0.68	0.66	0.69
Protein, pct.	13.5	13.6	12.4	12.7	12.1
Carotenoid content, p.p.m.	5.0	5.0	4.8	4.8	5.1
MACARONI:					
Numerical rating	2	3	2	3	2

[1] Only one sample submitted.

[2] No samples of Durum Wheat received in 1959.

CONCLUSIONS

For each of the subclasses of wheat weighted averages covering the factors tested have been computed and are given in the report. Along with these averages are shown comparisons with the weighted averages for the 1959 crop.

For the class Hard Red Winter Wheat the test weight of the 1960 crop Dark Hard Winter Wheat was on the average 1.8 pounds greater than that of the 1959 crop, but the test weight of Hard Winter Wheat for both years was the same and that of the Yellow Hard Winter Wheat 1.2 pounds less than in 1960. Protein content and sedimentation value of the subclass Dark Hard Winter were 1.3 percent and 9 units lower, respectively, in 1960 than in 1959, while the other two subclasses showed little difference for the two years in these respects. On other factors the Hard Red Winter Wheat crop for both years was nearly alike.

In comparing the subclasses of Hard Red Spring Wheat for the two years we find that the test weights were very much alike for both years while the weight per 1000 kernels was 2.8 and 1.9 grams lower in 1960 for Dark Northern Spring Wheat and Northern Spring Wheat, respectively. The protein content for both subclasses was similar each year; however, the average sedimentation value of Northern Spring Wheat in 1960 was 12 units lower than in 1959.

Soft Red Winter Wheat of the 1960 crop was quite similar to the 1959 crop in its properties. Western White Wheat had on the average 15.2 percent less hard kernels than the 1959 crop and this was also reflected in the protein content being 0.7 percent less. The milling score of White Club Wheat in 1959 was almost 8 units lower than in 1958 and in 1960 the value was 9.1 units higher than in 1959. In other respects in 1960 the class White Wheat was very much like that of 1959.

Examination of the semolina yields of the 1960 crop of Durum Wheat shows that the trend indicated in the 1959 crop was continued in that they were again about 6 percent lower than the 1959 crop. In other respects the 1960 Durum Wheat crop was similar to the 1959 crop.